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B3J 1F2 3 4

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GB 1017558 GB 0813638

(58) Field of search
B8D
B3J
Selected US specifcations from IPC sub-class B65D

(54) Seaming ends to containers

(57) The end of a container 7 is seamed to the body of a container such that the layers of the finished seam are parallel to the plane of the end and perpendicular to the axis of the body. A sealing composition 9 may be applied to the container end. The end may be of metal, plastics or laminated material with layers of plastics aluminium foil, cardboard or other material. The container body may be cylindrical or prismatic. If ends are applied to both top and bottom of the body then circumferential grooves forming internal projections are formed to support the ends during seam formation (Figures 6-8) and the edge of the body is folded by a first device (Figure 7) through 180° around the already folded up edge of the end and then a second device provides an axial and/or rolling force to deform the folded edges into the final position parallel to the plane of the end. When only one end is to be applied, a lifting plate raises the end from within the container and the edge of the container is prefolded over at an angle of 180° (Figure 4).

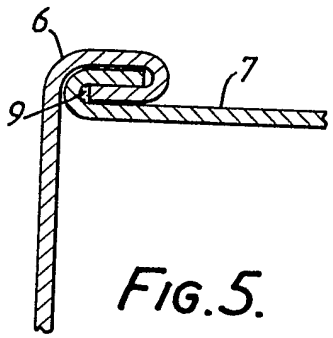

FIG.5.

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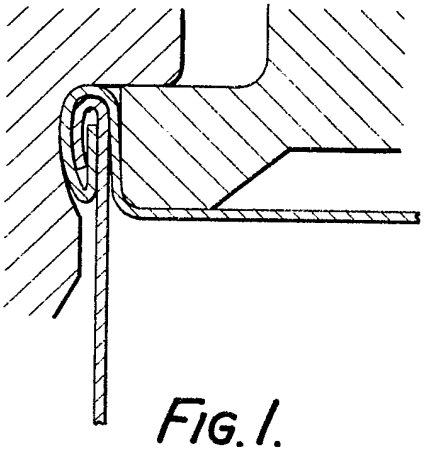

FIG. 1.

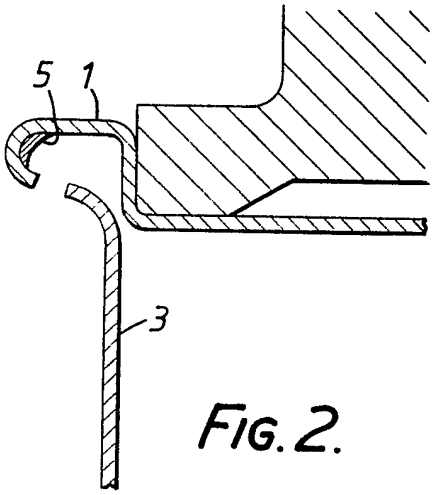

FIG. 2.

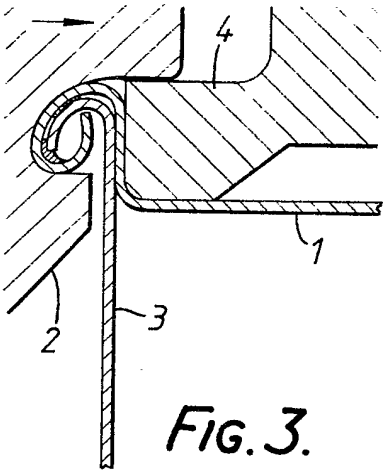

FIG. 3.

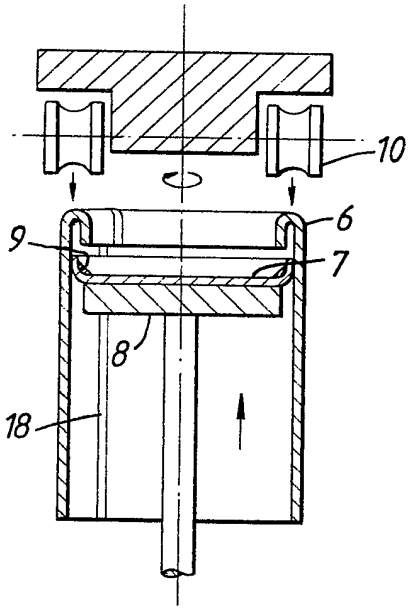

FIG. 4.

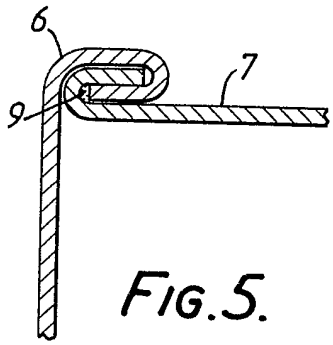

FIG.5.

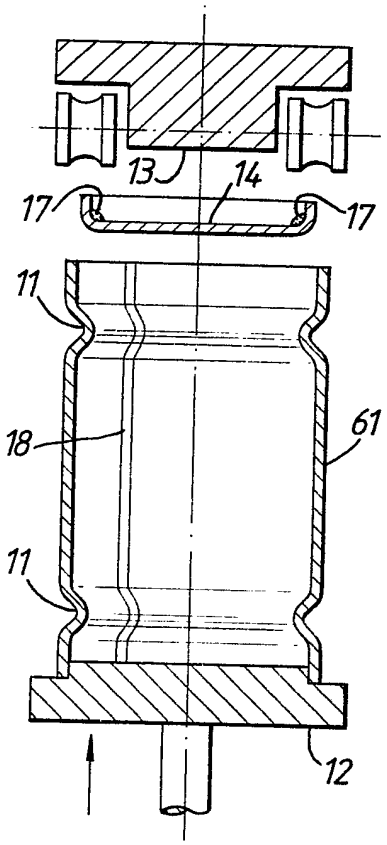

FIG.6.

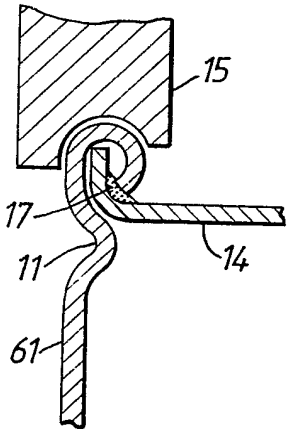

FIG.7.

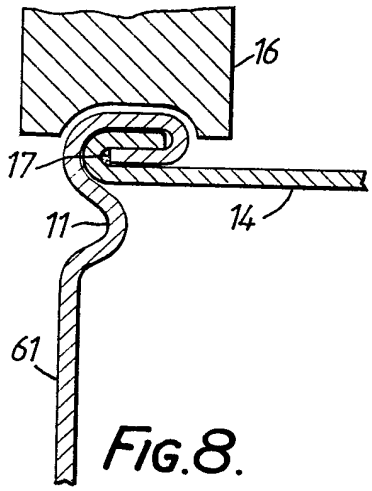

FIG.8.

SPECIFICATION

Containers and process for lock seaming their ends

The present invention relates to containers and to a process for lock seaming their ends.

In the manufacture of cylindrical containers for use in packaging, such as metal cans, it is customary to join the cylindrical body to the circular ends by a lock seaming process, which consists in folding the edge of the end once or twice around the edge of the body. This process is also applied to containers of prismatic shape with a square, rectangular, oval or other section.

In addition to the joining of the body to the ends, the purpose of the lock seaming is to maintain the leaktightness of the container under the conditions of temperature and pressure applied in the packaging and sterilisation processes. This aim is achieved through the labyrinth action of the various folds of material constituting the lock seam, through the pressure exerted between the various layers as a result of the deformation undergone, and through the compression between the folds of an elastic material (rubber) which is applied to the container material before the lock seaming.

The aim of the present invention is to introduce a new type of lock seaming which, while retaining the characteristics of normal lock seaming, makes it possible to utilise a smaller amount of material.

The body may be cylindrical or prismatic and the or each end may have a sealing composition applied to its inner or outer surface to assist in sealing the lock seam.

According to the invention, in a container having one or two ends lock seamed to a body, the folded portions of the or each assembly comprising one end and the body form a lcok seam in which the layers are parallel to the plane of the end and perpendicular to the axis of the body.

The body may have circumferential grooves formed in its outside surface to constitute internal projections which support the end during the formation of the lock seam. The end or ends may be of metal, plastics or other suitable material.

The invention also resides in a process for lock seaming the ends of containers, which comprises the stages of:

a) folding through 180° the end of a cylindrical or prismatic body, by rolling or axial compression, towards the interior of said body;

b) folding the peripheral edge of a flat end in such a manner that it has a U-shaped section;

c) engaging the folded edge of the end in the folded edge of the body; and

d) applying an axial and/or rolling force to deform the folded edge of the body and the folded edge of the end together until the folded layers of the body and end are horizontal and parallel to the plane of the end and perpendicular to the axis of the body.

The present invention will be better understood from the following detailed description and the accompanying drawings, in which:

Figure 1 shows schematically the most common type of conventional lock seaming,

Figure 2 shows schematically the shape of the body and end (lid or bottom) before the conventional lock seaming,

Figure 3 shows schematically the conventional lock seaming process,

Figure 4 shows a first embodiment of the lock seaming process of the invention in the case of a container which is to be lock-seamed at one end,

Figure 5 shows schematically the final shape of the lock seam according to the process shown in Figure 4,

Figure 6 shows a second embodiment of the lock seaming process according to the invention in the case of a container to be lock-seamed at both ends,

Figure 7 shows a first stage in the formation of the lock seamed rims in the process shown in Figure 6, and

Figure 8 shows the final stage in the formation of the lock seamed rims in the process shown in Figure 6.

Figure 1 shows the most common type of lock seaming, known as double lock seaming. Figure 2 shows the shape of the body and end (lid or bottom) before the lock seaming operation, and Figure 3 shows the lock seam during the process of formation, which consists in deforming the rim of the end 1 with the aid of a roller 2 turning around the end while applying a radial force to it. The end is held in contact with the body 3 by a centering plate 4. A rubber-based sealing composition 5 is applied to the surface of the end 1 to assist in making the seal.

In the first embodiment of the present invention, illustrated in Figures 4 and 5, use is made of:

1) A cylindrical or primsatic body 6 whose edge is folded over at an angle of 180°C towards the interior of the cylinder by rolling or axial compression, in such a manner that the inside diameter of the folded edge is smaller than the inside diameter of the cylinder by at least four times the thickness of the material used;

2) a U-section end 7, to the inner surface of which a rubber-based sealing layer 9 is applied; when the end 7 is circular, the outside diameter of its upfolded edge is substantially equal to the inside diameter of the body;

3) a lock seaming machine equipped with known means for feeding bodies and ends and for the extraction of lock seamed containers, and also with one or more lifting plates 8 for raising the end 7 from the bottom of the cylindrical body 6 to the top, where the cylindrical portion or edge of the end 7 engages in the folded edge of the body 6. The same machine has one or more lock seaming heads provided with suitably profiled rollers 10, which by means of a continuously applied force in the axial direction conjointly deforms the folded edge of the body 6 and cylindrical portion or edge of the end 7 until it produces a lock seam of the kind shown in Figure 5, in which the superimposed layers of material of the body 6 and end 7 meet one another in a horizontal position parallel to the

horizontal surface of the end and perpendicular to the cylinder constituting the body of the container, with the terminal edge of the body 6 embedded in the sealing material 9. Depending on the thickness, this operation may also be carried out with the aid of a non-rotating device applying axial pressure.

The embodiment described above does not permit the application of the lock seaming process according to the invention to both ends of a sheet metal cylinder. This is because, once one end has been lock seamed, it will be impossible to insert the lifting plate 8 into the container. Consequently, an alternative embodiment of the invention has been devised which permits lock seaming at both ends, as described below, with reference to Figures 6 to 8.

In the sheet metal cylinder 61 which constitutes the body of the container, two circumferential grooves 11 of suitable depth are formed with the aid of a machine known in the metal container manufacturing industry. The body is fed to a lock seaming machine equipped with known means for feeding bodies and lids and for the extraction of lock seamed containers, in which machine a lifting plate 12 lifts the body towards a lock seaming head 13. Before the body comes into contact with the head, a suitable device deposits an end 14 in the top of the body, where it is supported by the internal projection corresponding to the upper groove 11. The end 14 carries sealing material 17 on its inner surface. The contact between the body 61 and the head 13 is made in two stages; in the first stage a series of rollers 15 of suitable shape deform the edge of the sheet metal cylinder 61, as illustrated in Figure 7. In the second stage another series of rollers 16 deforms the assembly comprising the body 61 and the end 14 until the configuration shown in Figure 8 is obtained, in which the folded portions of the body and end form a lock seam in which the layers are parallel to the plane of the end 14 and perpendicular to the axis of the body 61 and the terminal edge of the body is embedded in the sealing material 17.

It should be noted that the reaction to the axial force applied to the lid, which in the arrangement shown in Figure 4 is taken by the lifting plate 8, is taken in the arrangement shown in Figure 6 by the circumferential grooves 11 in the body, which in turn transmit it to the lifting plate 12. The process can be repeated at the other end of the container after the latter has been filled.

The end or ends 7, 14 will normally be of metal but may alternatively be of plastics material, or they may be of laminated material comprising plastics, cardboard, aluminium foil or other materials.

The body 6 or 61 will normally be a metal can body formed from a flat sheet into a cylinder with its edges joined by a vertical welded seam 18 of the kind which is compressed while still hot after welding, so as to flatten it and thereby reduce the extra thickness in the region of the seam, thus alleviating the problem of achieving a leaktight seam in that region.

CLAIMS

1. A container having one or two ends lock seamed to a body wherein the folded portions of the or each assembly comprising one end and the body form a lock seam in which the layers are parallel to the plane of the end and perpendicular to the axis of the body.

2. A container according to claim 1, wherein the body has circumferential grooves formed in its outside surface to constitute internal projections which support the end during the formation of the lock seam.

3. A container according to claim 1 or 2 wherein the body is cylindrical.

4. A container according to claim 1 or 2, wherein the body is prismatic and its cross-section is square, rectangular, with rounded edges, or oval.

5. A container according to any one of the preceding claims, wherein the or each end has a sealing composition applied to its inner or outer surface to assist in sealing the lock seam.

6. A container according to any one of the preceding claims wherein the end or ends is or are of metal.

7. A container according to any one of claims 1 to 5, wherein the end or ends is or are of plastics material.

8. A container according to any one of claims 1 to 5, wherein the end or ends is or are of laminated material comprising plastics, cardboard, aluminium foil or other materials.

9. A process for lock seaming the ends of containers, which comprises the stages of:

a) folding through 180° the end of a cylindrical or prismatic body, by rolling or axial compression, towards the interior of said body;

b) folding the peripheral edge of a flat end in such a manner that it has a U-shaped section;

c) engaging the folded edge of the end in the folded edge of the body; and

d) applying an axial and/or rolling force to deform the folded edge of the body and the folded edge of the end together until the folded layers of the body and end are horizontal and parallel to the plane of the end and perpendicular to the axis of the body.

10. A process according to claim 9 wherein the end is raised from the bottom of the body by a lifting device to engage the folded edge of the body.

11. A process according to claim 9, wherein circumferential grooves are formed by deformation in the outer surface of the body, in such a manner as to constitute projections on the inside wall which support the end therein, and a first device applying an axial and/or rolling force deforms the edges of the end and the body until a first configuration is obtained, and a second device applies an axial and/ or rolling force until the folded portions are horizontal and parallel to the plane of the end and perpendicular to the axis of the body.

12. A process according to any one of claims 9 to 11, wherein, in the case of a circular end, the outside diameter of the folded edge of the end is

equal to the inside diameter of the cylindrical body.

13. A process according to claim 12, wherein the inside diameter of the folded edge of the body is smaller than the inside diameter of said body by at least four times the thickness of the material of the body.

14. A container having an end lock seamed to a body substantially as hereinbefore described and as illustrated in Figures 4 and 5 or Figures 6 to 8 of the accompanying drawings.

15. A process for lock seaming the ends of containers, substantially as hereinbefore described and as illustrated in Figures 4 and 5 or Figures 6 to 8 of the accompanying drawings.

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